

Abstract

Adaptive antenna array techniques for use in an orthogonal frequency division multiplexed spread-spectrum multi-access (OFDM-SSMA) cellular wireless system or other type of wireless communication system. A base station of the system includes an antenna array and a base station receiver. The base station receiver implements an adaptive antenna gain algorithm which estimates a spatial covariance matrix for each of K mobile stations communicating with the base station. The spatial covariance matrix for a given one of the mobile stations is determined at least in part based on a unique hopping sequence of the mobile station, and provides a correlation between signals received from the mobile station at different antenna elements within the antenna array. An average spatial covariance matrix for a set of received signals is also generated. The individual spatial covariance matrices and the average spatial covariance matrix are processed to generate an estimate of an interference matrix for the K mobile stations, and the estimate of the interference matrix is further processed to generate array responses for each of the mobile stations. The array response for a given mobile station is processed to determine an antenna weighting which is applied to a signal received from the given mobile station in order to facilitate detection of a corresponding transmitted symbol.